

Benchmark Post Test Review

Secondary Math 3H

Name _____ Date _____ Period _____

Identify the intercepts of the function rounded to the nearest hundredth.

1. $f(x) = -3\sqrt{x+5} - 1$

$(0, -7.71)$

2. $f(x) = 2\sqrt{3-x} + 8$

$(0, 11.46)$

Identify the intervals where the function is increasing and decreasing.

3. $f(x) = x^3 - 3x^2 + x - 5$

Inc.: $(-\infty, 0.18)$ $(1.82, \infty)$

Dec.: $(0.18, 1.82)$

4. $f(x) = -2x^3 + 5x^2 - 2x + 2$

Inc.: $(0.23, 1.43)$

Dec.: $(-\infty, 0.23)$ $(1.43, \infty)$

Determine the end behavior of each function using limits.

5. $f(x) = e^{x+2} - 1$

$\lim_{x \rightarrow \infty} f(x) = \infty$

$\lim_{x \rightarrow -\infty} f(x) = -1$

6. $f(x) = x^2 + 2x - 7$

$\lim_{x \rightarrow \infty} f(x) = \infty$

$\lim_{x \rightarrow -\infty} f(x) = \infty$

Describe the transformations that have been applied to $f(x)$ to create $g(x)$ if:

7. $g(x) = f(x+2) - 7$

Horizontal shift left 2
Vert. shift down 7

8. $g(x) = -5f(x-4)$

Reflection over x-axis
Vertical stretch by factor of 5
Hor 2. shift right 4Determine whether each function is even, odd or neither. Show work!

9. $f(x) = x^2 + 6$

even

$f(x) = (-x)^2 + 6$
 $= x^2 + 6$

same

10. $f(x) = \frac{-1}{5}x^2 + 2x$

neither

$f(-x) = \frac{-1}{5}(-x)^2 + 2(-x)$
 $= \frac{-1}{5}x^2 - 2x$

$-f(x) = \frac{1}{5}x^2 - 2x$

11. $f(x) = 2x^3 - 7x$

odd

$f(-x) = 2(-x)^3 - 7(-x)$
 $= -2x^3 + 7x$

$-f(x) = -2x^3 + 7x$

Find the average rate of change for each function on the specified interval. Show work!

18. $f(x) = -\sqrt[3]{15-x} + 4$ on $[-12, 7]$

$$f(-12) = 1 \quad f(7) = 2 \quad \frac{2-1}{7+12} = \boxed{\frac{1}{19}}$$

19. $f(x) = x^3 - 2x + 1$ on $[-1, 3]$

$$f(-1) = 2 \quad f(3) = 22 \quad \frac{22-2}{3+1} = \frac{20}{4} = \boxed{5}$$

20. Find the average rate of change on the specified interval and interpret its meaning.

The average high temperature per month in the city of South Jordan for the year 2012 is shown in the table below. Determine the average rate of change from September to December.

Month	Temp °F	Month	Temp °F
Jan	41	July	96
Feb	47	Aug	93
March	57	Sept	83
April	65	Oct	68
May	76	Nov	53
June	88	Dec	42

$$\frac{42-83}{12-9} = \frac{-41}{3} \approx -13.67$$

Ave temp. decrease
-13.67°/mon.

Find the domain of each function.

21. $f(x) = \frac{x+2}{x-7}$ $x-7 \neq 0$

$$D: (-\infty, 7) \cup (7, \infty)$$

22. $f(x) = \frac{-3}{x^2-4}$ $(x+2)(x-2) \neq 0$

$$D: (-\infty, -2) \cup (-2, 2) \cup (2, \infty)$$

Solve for the specified variable.

23. $\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$, solve for M_2

$$M_2 = \frac{M_1 r_1^2}{r_2^2}$$

24. $\sqrt{b^2 - 4ac} = k$, solve for c

$$c = \frac{k^2 - b^2}{-4a}$$

25. Use a graphing calculator to determine when $f(x) = g(x)$ if $f(x) = \sqrt{x} - 2$ and $g(x) = -|x| + 5$.

(Round your answer to the nearest tenth.)

$$x = 4.8$$

• Rewrite the given equation in exponential form.

37. $\log_5 x = 2$

$5^2 = x$
 $x = 25$

38. $\log_b 4 = y$

$b^y = 4$

Use the properties of logarithms to evaluate the expression.

39. $5^{\log_5 6} = 6$

40. $\log_6 6^3 = 3$

41. $\ln(1) = 0$

Solve each equation.

42. $\log_4(5x-1) = 3$

$4^3 = 5x-1$

$x = 13$

43. $3^{x+2} = 25$

$(x+2)\ln 3 = \ln 25$

$x = 0.9299$

44. $e^{2x} - 4e^x + 3 = 0$

$u = e^x$
 $u^2 - 4u + 3 = 0$
 $(u-3)(u-1) = 0$
 $u = 3, u = 1$

$3 = e^x \rightarrow x = \ln 3$
 $1 = e^x \rightarrow x = 0$

45. $(x+1)^2 - 3(x+1) + 2 = 0$

$u = x+1$
 $u^2 - 3u + 2 = 0$
 $(u-2)(u-1) = 0$
 $u = 2, u = 1$

$2 = x+1 \rightarrow x = 1$
 $1 = x+1 \rightarrow x = 0$

Write each expression as a single logarithm.

46. $3\log_2 x + \log_2 y - 2\log_2 z$

$\log_2 \frac{x^3 y}{z^2}$

47. $\log_6 x - 4\log_6 y + 3\log_6 x$

$\log_6 \frac{x}{y^4 x^3} = \log_6 \frac{1}{x^2 y^4}$

Expand each expression using the properties of logarithms.

48. $\log_3 \frac{x^4 y}{z^5}$

$4\log_3 x + \log_3 y - 5\log_3 z$

49. $\log \frac{(x+1)(y-2)}{3}$

$\log(x+1) + \log(y-2) - \log 3$

Evaluate each logarithm.

50. $\log_3 26 \approx 2.9656$

51. $\ln 14 \approx 2.6391$

Find the inverse of the function.

52. $f(x) = \ln(x+2) - 7$

$f^{-1}(x) = e^{x+7} - 2$

53. $f(x) = \log(x-4) + 5$

$f^{-1}(x) = 10^{x-5} + 4$